The Afghanistan Engineering Support Program assembled this deliverable. It is an approved, official USAID document. Budget information contained herein is for illustrative purposes. All policy, personal, financial, and procurement sensitive information has been removed. Additional information on the report can be obtained from Firouz Rooyani, Tetra Tech Sr. VP International Operations, (703) 387-2151.

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ENGINEERING SUPPORT PROGRAM

WO-LT-0057

Fire Suppression Systems Assessment at Tarakhil Thermal Power Plant – Final Report

June 26, 2012 Final

This publication was produced for review by the United States Agency for International Development. It was prepared by Tetra Tech, Inc.

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June 26, 2012

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Re: WO-LT-0057 Fire Suppression Systems Assessment at Tarakhil Thermal Power Plant

[redacted]

Enclosed is the final report for the subject project.

I look forward to meeting with you at your convenience to discuss this report.

Respectfully,

[redacted] P.E.
Deputy Chief of Party (AESP)
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Cc: [redacted] (POC USAID-OEGI)

AFGHANISTAN ENGINEERING SUPPORT PROGRAM

WO-LT-0057
Fire Suppression Systems Assessment at Tarakhil Thermal Power Plant
Final Report

June 26, 2012

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Executive Summary

USAID requested the Afghanistan Engineering Support Program (AESP) to perform an assessment of the fire suppression systems at the Tarakhil Thermal Power Plant (Tarakhil TPP) near Kabul in Afghanistan. There was concern that the TPP fire suppression systems may never have been properly functional.

The objective of this project work order was for Tetra Tech (Tt) to assess the fire suppression systems at Tarakhil TPP and produce a report with a course of action (COA) to remedy the deficiencies in these systems.

Tetra Tech performed two site visits to Tarakhil Thermal Power Plant (Tarakhil TPP) to collect data on which to base a technical assessment of the fire alarm and fire suppression systems. The Tt assessment team consisted of a Senior Electrical Engineer, Junior Electrical Engineer, Senior Civil Engineer and the AESP Water/Sanitation Sector Lead.

Types of data collection activities performed during the site visits included:

- Meetings with Tarakhil TPP operators (Black and Veatch (B&V) and Da Afghanistan Breshna Sherkat (DABS) employees
- Obtained plans, specifications, as-built drawings, records of inspection/testing and operations and maintenance (O&M) manuals
- Visual inspections of systems
- Photographs
- Observation of operations such as a pressure test on the fire water distribution line and operation of the firefighting foam system

After the review of the data collected from the site visits and observation of operations, the following items were observed regarding the TPP fire suppression systems:

- Two pressure tests confirmed that the leaking problem in the HDPE water supply pipe has been resolved.

- Foam House A, B and C foam bladder tank levels are full.

Tetra Tech recommends the following course of action (COA) for the TPP fire suppression systems. A detailed COA can be found in Section 4.0 Conclusions.

- DABS employees have received basic fire extinguishing training. It is recommended that the Fire Department provide periodic fire safety training including basic training, fire procedures and coordination training to DABS employees. It is suggested that DABS operators perform simulated fire alarm drills in coordination with the Kabul Fire department.

- A dedicated person should be assigned among the DABS employees responsible for power plant fire safety.

- Request documents from B&V that document that the gas supply systems in the Control Rooms are tested and fully operational.

- Acquire all acceptance test documentation for the fire suppression system from B&V.

- Request Simplex to recommend a material list of spare parts for the fire alarm and suppression systems for immediate replacement to be kept on site. It suggested that locate a local technician familiar with the Simplex fire suppression systems for emergency service.

- Additional well water production capacity may be required.

In conclusion, the technical assessment of the fire alarm and fire suppression systems indicates that all fire suppression systems appear functional but will require recommended maintenance, increased water well production capacity, employee training and coordination with Simplex to insure reliable operation of the automated alarms and controls.

1.0 Background and Objective

USAID requested the Afghanistan Engineering Support Program (AESP) to perform an assessment of the fire suppression systems at the Tarakhil Thermal Power Plant (Tarakhil TPP) near Kabul in Afghanistan. There was concern that the TPP fire suppression systems may never have been properly functional.

The objective of this project work order was for Tetra Tech to assess the fire suppression systems at Tarakhil TPP and produce a report with a course of action (COA) to remedy deficiencies in these systems.

2.0 Investigation

2.1 Site Visits and Data Collected

Tetra Tech (Tt) performed two site visits to Tarakhil Thermal Power Plant (Tarakhil TPP) to collect data on which to base a technical assessment of the fire alarm and fire suppression systems. The Tt assessment team consisted of a Senior Electrical Engineer, Junior Electrical Engineer, Senior Civil Engineer and the Water/Sanitation Sector Lead.

Types of data collection activities performed during the site visits included:

- Meetings with Tarakhil TPP operators (Black and Veatch (B&V) and Da Afghanistan Breshna Sherkat (DABS) employees
- Obtain plans, specifications, as-built drawings, records of inspection/testing and operations and maintenance (O&M) manuals
- Visual inspections of systems
- Photographs
- Observation of operations such as a pressure test on the fire water distribution line and operation of the firefighting foam system

2.1.1 Tarakhil Site Visit - May 17, 2012

The Tt assessment team visited the site on May 17, 2012. Notes of conference for the meeting held between assessment and the Tarakhil plant operating personnel are in Appendix A. Photographs were taken (Appendix B). Tt received a site plan drawing that shows plant general layout and highlights the configuration of the existing underground high density polyethylene (HDPE) pipe fire water loop system (Figure 1).

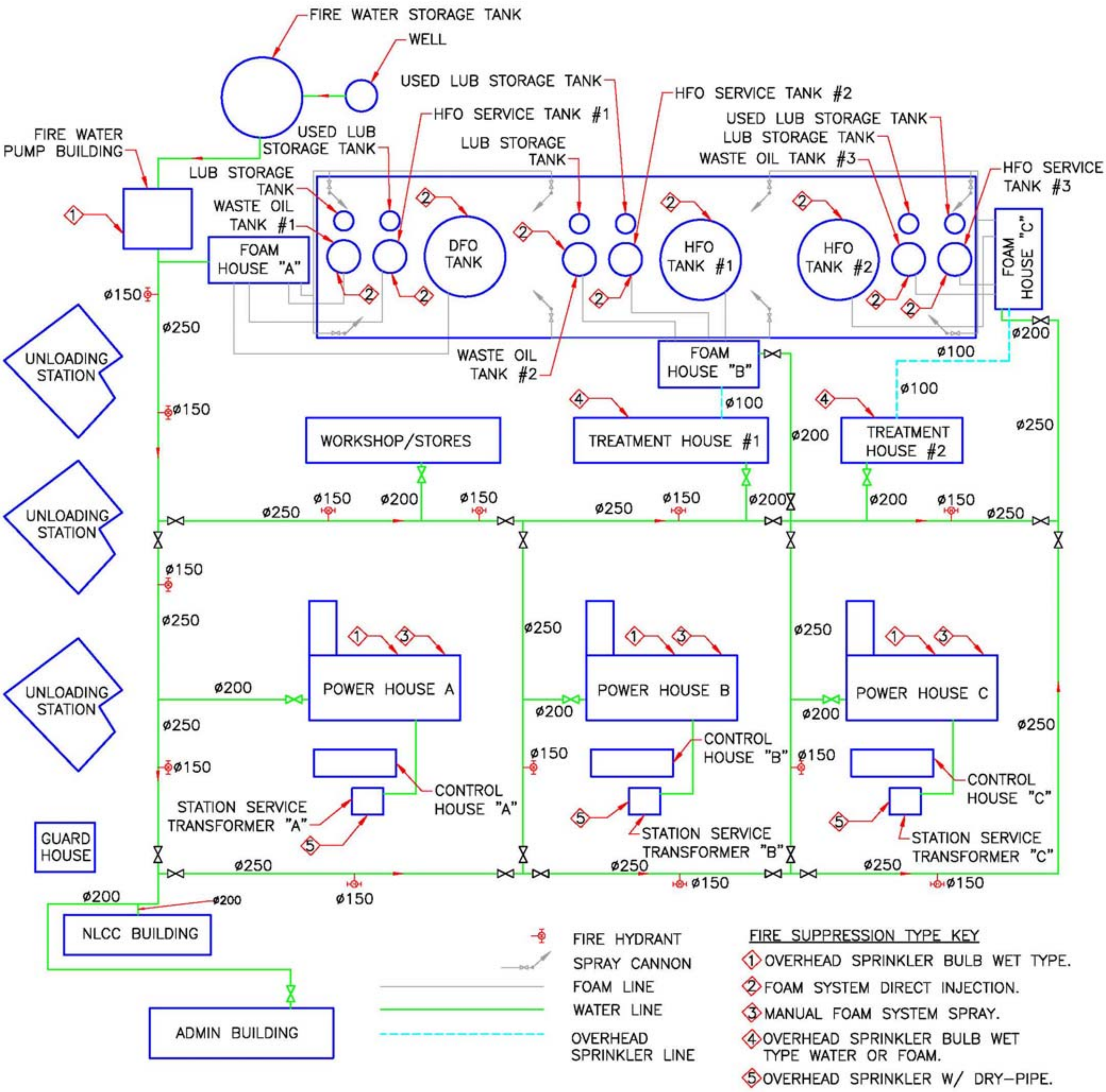


Figure 1: Plant Layout and Fire Water Pipe Schematic

2.1.2 Tarakhil Site Visit – June 5, 2012

The Tt assessment team visited the site on June 5, 2012. Notes for the meeting held between assessment and the Tarakhil TPP operating personnel are in Appendix C. Photographs were taken. Documents requested during the first meeting were received.

1. One of the primary objectives of the second site visit was to witness the pressure test of the 125 psi HDPE underground fire water line. Shortly after construction, when the fire water pipe was first pressurized it was discovered that several joints in the pipe were leaking. B&V had stated that all of the defective fused HDPE joints had been unearthed and repaired, but a record of testing was not available. B&V had agreed to pressure test the pipe during this second site visit using the Plastic Pipe Institute (PPI) test procedure proposed by the assessment team. The PPI test requirements calls for raising the pipe system pressure to 1.5 times design working pressure (1.5 X 125 psi = 188 psi) over four hours, then reducing pressure 10psi, to 178psi for one hour. The 178 psi pressure must then remain within 5% of the target value for a set period of time to indicate no leaks in the pipe system. Results of the pressure test are provided in Section 2.2.3.

2. The assessment team wanted to see the progress of repairs to the Simplex fire detection and alarm system, located in Control Room building B, which was not functional during the first site visit. B&V had scheduled for an engineer from Turkey to be on site Friday, May 18, 2012 to install a new monitor and computer, check the Simplex-USA system settings, establish appurtenant links and replace any defective parts of the monitoring system. It was stated by B&V that the system is receiving and sending signals from/to each Remote Radio Transmitters installed in each building having a Fire Alarm Control Panel (FACP).

3. B&V had also scheduled firefighting/protection training for the DABS plant operations personnel which was to occur between the site visits.

2.1.3 Data Collected

B&V provided the following data to Tt between the two site visits:

1. Wednesday May 23, 2012 – B&V provided Three CDs:
    - Fire Alarm and Shop Drawing – 1
    - Fire Alarm and Shop Drawing – 2
    - Fire Suppression Drawing
2. Saturday May 26, 2012 – B&V provided CDs:
    - Fire Suppression SOW & Fluid Calculations
3. Tuesday June 5, 2012 – B&V provided Three CDs:
    - Fire training photos
    - Test reports fire suppression, detection and alarm
    - HDPE pipe pressure test May 30, 2012

2.2 Fire Suppression System

2.2.1 Fire Water Supply

The fire water source supply at the Tarakhil TPP is provided by an existing well that is equipped with a 150 liters/min (40 gal/min) pump system used to fill the existing 1.5 million liter (396,000gal) storage tank. See Photograph 1, 2 and 3 (Appendix B). In the event of need, the stored water is distributed through an existing 250mm (10in) underground HDPE pipe loop configuration which provides site fire water supply, through hydrants, as well as the pressurized water supply required for the plant building sprinklers, hose stations and foam systems. See Figure 1.

2.2.2 Underground Fire Protection Loop Pipe Leaks

During the first site visit, [redacted] of B&V explained that because of leaks in the plant HDPE fire water distribution system only portions of the fire suppression system have been fully operational up to this time. B&V also stated that the leaking joints in the HDPE pipe have been repaired. One of the recent, belowground repair locations remained exposed, see Photograph 4.

During the first site visit B&V demonstrated the power and range of the 125 psi underground water line. Two hoses were attached to an existing fire hydrant and the hydrant valve was opened. The DABS trainees manned the hoses see Photograph 5. The hoses required two men to control. Water was sprayed in the air for several minutes. This demonstration also activated the alarm system located in the Pump House Building. Fire hydrants are located throughout the plant at locations indicated on Figure 1. Hoses are stored in cabinets near the hydrants to extend fire water coverage. See Photograph 6.

2.2.3 Pressure Testing

The pipe pressure test of the underground HDPE pipe system occurred during the second site visit June 5, 2012. B&V started the four hour pressurizing process at 5:30 am to accommodate the site visit schedule. During the four hour period of the test the HDPE is "stretched" and additional pressure is applied as required to maintain the 188 psi pressure. The Tt assessment team arrived at the Pump House building at 9:40 am to witness the pressure being reduced to 178 psi for the one hour test period, see Photograph 7. The Tt assessment team returned to the Pump House building at 10:30 am to witness the pressure reading which had dropped to 173 psi, see Photograph 8. This represents a pressure drop of approximately 2.8%, well within the 5% compliance range. Since the test period was slightly less than the full one hour, B&V personnel remained at the pump house till the full hour had expired. Photographs 7 and 8 show the digital readouts from the Diesel Engine Fire Pump Controller panel at the start and at the end of the pressure test.

B&V had run the identical pressure test on May 30, 2012 and had observed similar results. The previous test results as well as the details from this pressure test are located in the Appendix D.

2.2.4 Pump House Building

Another main component of the fire water supply system is the Pump House building (Photograph 9) which contains the three pumps that keep the underground fire water line pressurized to 125 psi. The fire suppression system in the Pump House Building is an overhead water sprinkler "Bulb Wet Type." The bulbs are design to shatter at 93^{o} C (200^{o} F). See Photograph 10.

The Pump House equipment is "skid mounted" and enclosed in a prefabricated enclosure supplied by Simplex-USA, a division of Tyco Fire and Building Products. The three automatic/manual controlled pumps operate in series to provide the fire suppression system required pressure and volume demands. One pump is a 380 V, 3 Phase, 50 Hz, 95 liters/min (25 gpm), 12.5 bar (150 psi), 3.73 KW (5 hp) centrifugal "jockey pump." The other two pumps are diesel engine driven 7,570 liters/min (2,000 gpm), 8.62 bar (125 psi), 186.43 KW (250 hp) horizontal centrifugal pumps. The Diesel Engine Fire Pump Controller panel provides automatic/manual control of the pumping system.

2.2.5 Power House Buildings A, B and C

Pressurized fire water is distributed to the three Power House buildings through branch 200 mm underground HDPE water lines that turn-up adjacent to the metal fabricated steel framed buildings. The water supply pipes are insulated, above finished grade, and equipped with gate valves. Inside the Power House buildings a "Bulb Wet Type" water fire protection system with temperature sensitive sprinkler heads is provided as shown on Photograph 11. The sprinkler heads are activated when fire produces enough heat to shatter the glass bulb sprinkler plugs at 79^{o} C (175^{o} F) and release the pressurized water over the fire area.

In addition, the three Power House buildings each have five manual foam spray systems (Photograph 13) installed in the four building corners and one along the middle north side of each building. The manual foam spray systems work by combining pressurized water and the foaming chemical through a flow-proportioner, a venturi style mixing device. The pressurized water/foam chemical mixture is discharged through the hose and a "foam-making" nozzle.

The foam chemical used in the Power House buildings and at other foam fire suppression systems throughout the plant is proprietary ANSULITE Alcohol Resistant Concentrate (ARC) 3%/6% Aqueous Film Forming Foam (AFFF) concentrate. See Photograph 15. The flow proportioner equipment supplied at the plant for the foam systems is designed to use the foam concentrate at 3% foam concentrate/water ratio. The product literature states that hose or pipe discharged foam will expand between 5 and 10 times the volume of ANSULITE foam chemical used "depending primarily on type of aspirating device and flow rate." In sprinkler systems the expansion ratio ranges between 2:1 and 4:1.

In addition to the overhead water sprinkler and manual foam spraying systems the Power House buildings are equipped with numerous portable foam fire extinguishers (Photograph 14). The water supply for the fire suppression "Dry Type" Station Service Transformer buildings A, B and C is provided through a proprietary Simplex distribution system that is shown in Photograph 12. The sprinkler water supply line is exposed to the atmosphere and is required to be a dry pipe system to prevent freezing.

2.2.6 Control Rooms A, B and C

The three control rooms have argon gas fire suppression pre-action systems. The argon gas is stored in pressurized cylinders (see Photograph 16) in an isolated room in each of the buildings. The gas is manually released (Photograph 17) when the last person leaving the room activates the system by pushing a button. The alarm system is activated by flame or smoke detected by the FD&AS in the two other rooms that house the computer and motor control centers.

2.2.7 Service Station Transformer Buildings A, B and C

The Service Station Transformer Buildings have a dry-pipe perimeter-head water sprinkler fire suppression system. It is a dry pipe system because the buildings are not heated and the fire water pipe is exposed to the elements. The dry water supply pipes originate in the Power House buildings and are isolated from the 125psi fire water source pipe by a pressurized diaphragm. If a fire occurs in one of the three Service Station Transformer buildings fusible alloy plugs release pressure from a pressurized air-pipe, originating in the respective location, at temperature 107.2^{o} C (225^{o} F), which in-turn releases pressure from the pressurized diaphragm and water flow through the sprinklers shown in Photograph 18. The dry pipe distribution system is a Simplex system that is shown in Photograph 12.

2.2.8 Administration Building

There is no sprinkler system in the Administration Building, however it does have two hose stations (Photograph 19).

2.2.9 Workshop/Stores Building

The Workshop/Stores building has no sprinkler system but has two hose stations and the portable fire extinguishers. The Simplex proprietary fire water distribution system is shown in Photograph 20.

2.2.10 Treatment House 1

The Treatment House 1 building has an overhead water/foam sprinkler system. The foam/water supply for the sprinkler system comes from Foam House B located adjacent to Treatment House 1. The sprinklers are “Bulb Wet Type” either water/foam fire protection system with temperature sensitive sprinkler heads as shown on Photograph 21. The sprinkler heads are activated when fire produces enough heat to shatter the glass bulb sprinkler plugs at 93^{o} C (200^{o} F); then it releases the pressurized foam/water over the fire area. In addition to the sprinkler system, there are two hose stations that are connected to the underground fire water line (Photograph 22) and portable fire extinguishers.

2.2.11 Treatment House 2

The Treatment House 2 building has an overhead water/foam sprinkler system similar to the Treatment House 1 building. The foam/water supply for the sprinkler system comes from Foam House C. The Treatment House 2 building is smaller than Treatment House 1 building and has one hose station that is connected to the underground fire water line. The Treatment House 2 building also has portable fire extinguishers including the mobile foam unit shown in Photograph 23.

2.2.12 Tank Farm

For fire suppression at fuel storage tanks located in the tank farm, foam is injected directly into the tank. The foam is produced in the three existing Foam House buildings A, B and C. All three foam buildings are similar. Equipment is “skid mounted” enclosed in a prefabricated housing. The foam chemical is stored in a bladder vessel which can be seen in

Photograph 24. The foam injection systems can be operated automatically or manually. The automatic systems are activated through the proprietary distribution piping systems located within each Foam House building and the heat and flame detectors located within the covered storage tanks.

Foam House A provides foam supply for tanks: DFO, HFO Service Tank #1 and Waste Oil Tank #1.

Foam House B provides foam supply for tanks: HFO Tank #1, HFO Service Tank #2 and Waste Oil Tank #2; also, sprinkler system in Treatment House 1 building.

Foam House C provides foam supply for tanks: HFO Tank #2, HFO Service Tank #3 and Waste Oil Tank #3; also, sprinkler system in Treatment House 2 building.

The foam injection piping into the fuel storage tanks can be seen clearly in Photograph 25 Just below the red devise at the top of the tanks, the foam injection point, is the "foam-maker" the aspirating devise that turns the foam chemical/water mixture into foam.

The fire suppression system in the tank farm area also includes several "foam/water shooting guns - cannons" permanently installed around the tank area perimeter that can be operated manually. On the second site visit the cannons were operated with foam. Because of the wind direction, and the cannon selected to operate, the foam had to shot on top of Treatment House 2 building. Photograph 26 shows the foam after it drained from the roof of Treatment House 2 building.

2.2.13 Unloading Station

The Unloading Stations have no sprinkler systems. Fire suppression devises include portable 9 kg dry chemical, 5 kg CO2 and portable foam extinguishers. There are also two existing fire hydrants with extension hoses located close by the Unloading Stations.

2.2.14 NLCC Building

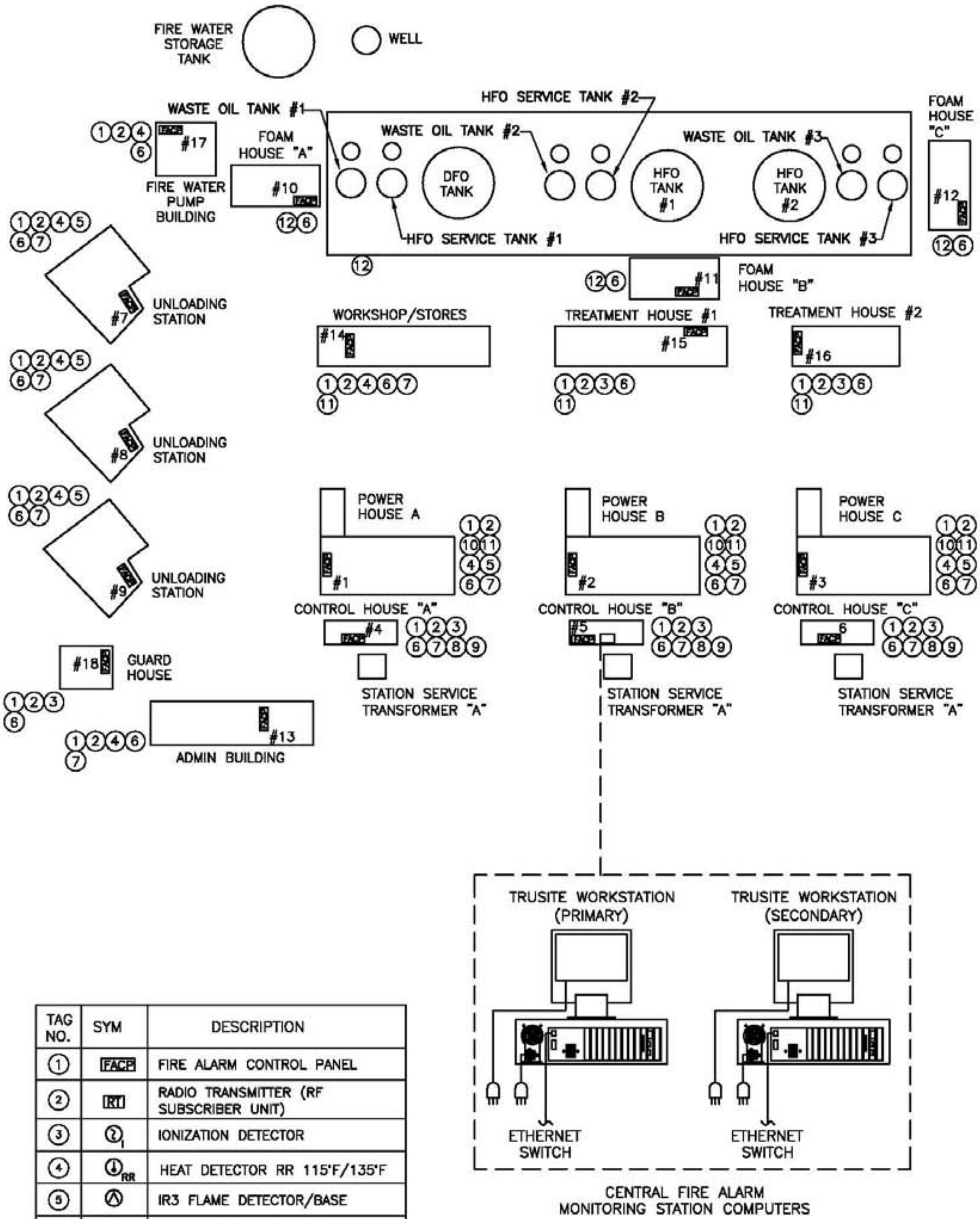
The National Load Control Center (NLCC) building has no sprinkler system but has one hose station shown in Photograph 27.

2.3 Fire Detection and Alarm System

Figure 2 shows a schematic of the Tarakhil TPP facility fire detection and alarm systems.

2.3.1 Fire Detection and Alarm System

The Tarakhil TPP has a proprietary addressable fire detection and alarm system. Each building has a dedicated fire alarm control panel (FACP) (Simplex, Model 4100U) to monitor alarm initiation and supervisory devices in the building.



TAG NO.	SYM	DESCRIPTION
1	FACP	FIRE ALARM CONTROL PANEL
2	RT	RADIO TRANSMITTER (RF SUBSCRIBER UNIT)
3		IONIZATION DETECTOR
4	RR	HEAT DETECTOR RR 115'F/135'F
5		IR3 FLAME DETECTOR/BASE
6	F	MANUAL ALARM STATION
7		HORN/STROBE
8	R	MANUAL RELEASE STATION
9	AB	ABORT STATION
10		TAMPER SWITCH
11		FLOW SWITCH
12	FR	FOAM RELEASE

Figure 2: Fire Detection and Alarm System

In the event of a fire, manual alarm stations, sprinkler flow switches, heat, flame and ionization detectors, foam system or other fire protection systems will signal to the FACP (Photographs 28 thru 38). The fire alarm control panel will activate building notification devices which notify building employees. At the same time the FACP will signal the Radio Transmitter Panel (RF Subscriber Unit –AES IntelliNet, Model 7788F) to link the building's fire alarm control panel to the central fire alarm monitoring station located in Control Room B.

Fire alarm signals are transmitted to the central fire alarm monitoring station via radio transmitter panels. The monitoring station includes two monitors and two dedicated computers for primary and secondary graphic systems.

2.3.2 Pump House Building

The Pump House Building fire detection and alarm system consists of an addressable fire alarm control panel (Simplex, Model 4100U), Radio transmitter panel (AES IntelliNet, Model 7788F), heat detector, manual alarm station, horn/strobes and flow and tamper switches.

2.3.3 Powerhouse Buildings A, B and C

Each building's fire detection and alarm system consists of an addressable fire alarm control panel (Simplex, Model 4100U), Radio transmitter panel (AES IntelliNet, Model 7788F), and heat detector, flame detectors, manual alarm stations, horn/strobes and flow and tamper switches.

2.3.4 Control Rooms A, B and C

Each building's fire detection and alarm system consists of an addressable fire alarm control panel (Simplex, Model 4100U), Radio transmitter panel (AES IntelliNet, Model 7788F), smoke detectors, manual alarm stations and horn/strobes.

The releasing solenoids, abort stations, release peripheral devices used for the argon gas fire suppression pre-action system are also connected to the fire detection and alarm system.

The central fire alarm monitoring station is located in Control Room B. Fire alarm signals are transmitted to the central fire alarm monitoring station via radio transmitter panels. The monitoring station includes two monitors and two dedicated computers for primary and secondary graphic systems.

Concerns were reported to the USAID that the Central Fire Alarm monitoring station computers were not functioning. During the initial site visit on May 17. 2012, B&V confirmed to the assessment team that the computers that monitor fire alarm were out of service due to a power surge. B&V had scheduled a Simplex technician from Turkey to be on site Friday May 18, 2012 to install new monitors and computers and check the Simplex-USA system settings, establish appurtenant links and replace any defective parts of the monitoring system.

During the second site visit on June 5, 2012 the Simplex technician was working on the AES IntelliNet 7705 type Central Receiver's software programming to complete the Central Fire Alarm Monitoring Station repairs. To document repairs, B&V agreed to submit to USAID and Tt assessment team, a screen shot of the monitor (image) during the alarm and test reports after the system repairs have been completed and the system is working properly.

2.3.5 Service Station Transformer Buildings A, B and C

There are no fire detection and alarm systems in any of the transformer buildings. Low pressure, tamper and flow switches used for dry-type sprinkler system are connected to Powerhouse Buildings A, B and C fire alarm control panels.

2.3.6 Administration Building

Building fire detection and alarm system consists of an addressable fire alarm control panel (Simplex, Model 4100U), radio transmitter panel (AES IntelliNet, Model 7788F), heat detectors, manual alarm stations, strobes, horn/strobes and a flow switch.

2.3.7 Workshop/Stores Building

Building fire detection and alarm system consists of an addressable fire alarm control panel (Simplex, Model 4100U), radio transmitter panel (AES IntelliNet, Model 7788F), heat detectors, manual alarm stations, strobes, horn/strobes and a flow switch.

2.3.8 Treatment House 1

Building fire detection and alarm system consists of an addressable fire alarm control panel (Simplex, Model 4100U), radio transmitter panel (AES IntelliNet, Model 7788F), heat detectors, manual alarm stations, horn/strobes and a flow switch.

2.3.9 Treatment House 2

Building fire detection and alarm system consists of an addressable fire alarm control panel (Simplex, Model 4100U), radio transmitter panel (AES IntelliNet, Model 7788F), heat detectors, manual alarm stations, horn/strobes and a flow switch.

2.3.10 Foam House Buildings A, B, and C

Each building's fire detection and alarm system consists of an addressable fire alarm control panel (Simplex, Model 4100U), radio transmitter panel (AES IntelliNet, Model 7788F), heat detector, manual alarm station and a horn/strobe.

The maintenance switch, manual foam release station, releasing solenoids and the release peripheral devices used for the foam system are also connected to the fire detection and alarm system.

2.3.11 Tank Farm

There is not a dedicated fire alarm control panel for the Tank Farm. Heat detectors and manual foam release stations located in the Tank Farm are monitored by fire alarm control panels located in the foam house buildings A, B and C.

2.3.12 Unloading Station A, B and C

Each building's fire detection and alarm system consists of an addressable fire alarm control panel (Simplex, Model 4100U), Radio transmitter panel (AES IntelliNet, Model 7788F), heat detector, flame detectors, manual alarm station and a horn/strobe.

2.3.13 NLCC Building

The National Load Control Center (NLCC) building fire detection and alarm system consists of an addressable fire alarm control panel (Simplex, Model 4100U), radio transmitter panel (AES IntelliNet, Model 7788F), heat and smoke detectors, manual alarm stations, and horn/strobes.

3.0 Analysis

3.1 Fire Suppression System

One of USAID's main concerns was the condition of the HDPE underground fire water supply pipe, which had a history of leaks. It was reported that the lines may never have been properly functional. Flow demonstrations and pressure testing performed during site assessment visits confirmed that the reported fire water supply and conveyance piping deficiencies have been corrected. The leaks in the HDPE underground fire water distribution pipe have been repaired.

Another concern expressed was that insufficient quantities of firefighting foam chemical were in inventory at the Tarakhil TPP. Foam House A, B and C foam bladder tank levels are now full. Adequate inventories of firefighting foam have been procured and are in inventory.

Deficiencies in staff training were another initial concern expressed by USAID. According to the sign-in sheets and other documentation provided by B&V, one week of basic firefighting training was provided by B&V for the DABS trainees between May 27 and June 3, 2012. Training included participation by two fire fighters from the Kabul Fire Fighting Department (KFFD).

From records provided by B&V the following activities were conducted during the May 27 through June 3, 2012 DABS basic firefighting training:

a. How to check portable hand held fire extinguishers and inspect the hose and gauge

b. How to remove the pin and aim and sweep around the fire

c. How to put out fires

d- Foam House operation

e- Introduction to the diesel fire pump control panel and how to start engine manually/automatically

f- How to connect the hose to a fire hydrant valve and open the valve

g- How to hold and control the fire hose

h- How to disconnect fire hose from fire hydrant and lay hose out strait

i- How to return fire hose back into the storage cabinet

j- How to open valve for foam system (foam was not used in the training)

k- How to remotely operate foam release valve

l- Aiming and operating the canon mounted on the containment wall around the tank farm and spraying water on the diesel fuel oil (DFO) storage tank, lube oil storage tank, and heavy fuel oil (HFO) storage tank (foam was not used in the training)

The following activities have shown to the trainees by KFFD:

a- How to put out fires

b- How to extinguish the fire

c- How to aim and sweep the fire

d- Sweeping around the fire

e- How to use foam fire extinguisher

f- How to extinguish liquid fires

g- How to use foam extinguisher

h- How to use Mobile Foam cart

i- How to prepare fire hose for storage

j- How the block fire sprinkler system works

k- How the foam extinguishers work

l- How to use fire hydrant with foam in power blocks

The intent of the training provided by B&V was to provide basic fire training techniques and stress the importance of basic first reaction to a fire. This training covered proper procedures to eliminating the fire source by shutting equipment off or eliminating the electrical supply or other fire hazards. After initial actions to eliminate the fire source, plant operators have been trained to call the Kabul Fire Department.

Another concern that USAID had identified was “a problem with one of the gas tanks” on the argon gas fire suppression systems in the three Control House buildings. During our first site assessment visit B&V stated that the tank problem has been resolved and the system is fully operational. The assessment team observed the condition of the argon gas system in Control House building B during the first site visit which seems complete and functional, although, the team did not find final testing documentation in documents collected for this report.

B&V has provided testing reports to show the Deluge valve diaphragm and hydraulic concentration control valves are working properly and that the underground HDPE fire water distribution pipe hydrostatic pressure test was successful.

USAID has not received a Contractor’s Material and Test Certificate for Aboveground Piping (per NFPA 13, NFPA 14), Contractor’s Material and Test certificate for Water Spray System (per NFPA 15) and Foam system Test Results (per NFPA 11 Chapter 11).

To confirm that there is sufficient water in the fire water storage tank, the assessment team made calculations on the fire water storage tank, see below.

According to NFPA 850, Recommended Practice for Fire Protection for Electric Generating Plans and High Voltage Direct Current Converter Stations, Section 6.2.1, fire water storage tank needs to be sized based on the largest of the following

1. 500 gpm hose stream for 2 hours = 60,000 gallons.

2. Largest fire suppression system demand for 2 hours.

NFPA 850 requires 8 hour replacement (credit for extra tank volume)

Existing Fire Water Tank Volume = 396,000 gal - **Tank Volume - Sufficient**

Largest fire suppression system demand for 2 hours = 2,000 gpm

Minimum tank size = 2 hours x 2000 gpm = 240,000 gal

Credit extra tank volume = 396,000 - 240,000 = 156,000 gal

Need to fill in 8 hours = 240,000 – 156,000 = 84,000 gal

Existing Fire Water Supply Pump Capacity = 40 gpm

Pump 8 hours = 40 gpm x 8 hours = 19,200 gal

Pump time to replace 84,000 gal = 84,000 gal / 40 gpm = 2,100 min

It would take approximately 35 hours (2,100 min) to replace 2 hour max fire demand – NFPA 850 requires 8 hour replacement – **Water Supply Pump Capacity – Not Sufficient**

3.2 Fire Detection and Alarm System

The fire detection and alarm system in the Tarakhil Power Plant (TPP) is in good working condition. Each building has a dedicated fire alarm control panel to monitor initiation alarm and supervisory devices in the building. Fire alarm control panels transmit supervisory or initiation alarms to the central fire alarm monitoring stations (Manufacturer: AES IntelliNet Central receiver) located in Control room B.

The objective for the second site visit assessment trip was to view the central fire detection monitoring system engaged. We were planning to see the fire alarm, supervisory and faulty alarm reports in the central fire alarm monitoring stations by activating the fire alarm initiation and supervisory system devices in the buildings that we had visited on the site trips. During this site visit, the Simplex technician was setting up the system's software program and the system was not ready for the report outputs. After the site visit, an email from B&V, confirmed that the central fire alarm monitoring system is fully functional and in working condition.

According to Simplex Fire Protection System Commissioning documents, fire alarm panels, fire alarm batteries, 240V single phase fire alarm panel branch circuit feeder, releasing solenoids, actuator switches, ionization, heat and flame detectors, tamper and flow switches have been tested and they are in working condition.

According to NFPA 72, National Fire Alarm and Signaling Code Chapters 26.4, Proprietary Supervising Station Systems, Proprietary Supervising stations shall be operated by at least two trained, competent personnel at all times. All communication and transmission channels between the proprietary supervising station and the protected premises control unit shall be operated manually or automatically once every 24 hours to verify operation. In addition the same code dictates that fire alarm system devices need to be inspected at certain intervals. Testing and inspection frequency for each fire alarm system device is different. They are shown in NFPA 72 table 14.4.2.2 and table 14.4.5.

We understand that B&V has provided Tarakhil TPP employees with basic fire alarm training, but not sufficient to keep the current fire detection and alarm system working long term. Required visual inspections may be done by the Tarakhil TPP employees, but the periodic testing should be performed by a highly trained qualified individual.

Spare parts of the Fire Detection and Alarm system devices are not readily available here in Afghanistan. Simplex should recommend a spare parts material list to be stored on site for immediate replacement.

4.0 Conclusions

4.1 Fire Suppression System

The Tt assessment team recommends the following course of action (COA):

- Two pressure tests were done on the HDPE underground fire protection pipe system that confirmed that the leaking problem has been resolved. There is no further action required.

- According to test reports obtained from B&V, the Foam House A, B and C foam bladder tank levels are full. This was also confirmed by B&V during the site visit. There is no further action required.

- DABS employees have received basic fire extinguishing training by B&V and the Kabul Fire department. In addition, it is recommended that the Kabul Fire Fighting Department provide periodic fire safety training including basic training and fire procedural and coordination training to DABS employees. It is also recommended that simulated fire alarm drills be coordinated with Kabul Fire department.

- According to B&V the control room gas supply is operational. There is no documentation that supports this statement. A request has been submitted to B&V to provide USAID with such documentation that supports that the system is tested and fully operational.

- In addition to testing reports that B&V provided, all acceptance test documentation for the fire suppression system should be provided.

- Request Simplex to recommend a material list of spare parts to be stored on site for immediate replacement. Recommend coordinating with a local highly qualified technician familiar with the Simplex fire suppression systems for emergency service.

- The basis-of-design values that were used for the well pump and fire water storage tank sizing were not available. Based on the estimation detailed in the Analysis section, the well pump size is inadequate. It is recommended that additional well water production capacity be provided.

- A dedicated DABS employee responsible for power plant fire safety is recommended. In addition, it is recommended that DABs provide periodic fire safety training (basic training and fire procedural and coordination training) to plant employees. Simulated fire alarm drills coordinated with Kabul Fire Fighting department is suggested.

- Spare parts for some of the sophisticated fire suppression system devices are not readily available here in Afghanistan. Simplex should recommend a material list that should be stored on site for immediate replacement. There should also coordination with a local technician familiar with the Simplex fire suppression systems for emergency service.

4.2 Fire Detection and Alarm System

The Tt assessment team recommends the following course of action (COA):

- The fire detection and alarm system is in good working order now. To keep the system running without any interruption, it is recommended that critical fire detection system devices proposed by Simplex be kept in on-site inventory to prevent long delays when repairs are necessary. Replacement of broken devices and reprograming the entire system scheduled through a local fire alarm company familiar with Simplex fire detection and alarm system is recommended. The local fire alarm company can respond, as required monthly, quarterly or semiannually to provide testing.

- Annual fire detection and alarm tests should be done by available Simplex representative.

- As of June 15 2012, USAID has not received the sign-in sheet verifying that TITAN provided fire alarm system training to the DABs employees. A sign-in sheet received from B&V for DABs training fire alarm system is dated September 6, 2011. The same sign-in sheet submitted by B&V with correct date.

Appendices

Appendix A

May 17, 2012

Meeting Minutes

Meeting Minutes

120517 WOLT0057 Meeting Minutes AY

Date: May 17, 2012 Location: Tarakhil Thermal Power Plant

Subject: WO-LT-0057 Tarakhil Fire Suppression Assessment- Tt and B&V personnel meeting

Attendees

Name	Organization	Email Address/Telephone No.
[redacted]	Programs Director Middle East-B&V	[redacted]
[redacted]	Power Plant Engineer B&V	[redacted]
[redacted]	B&V	[redacted]
[redacted]	Deputy TOM/Project Controls Manager	[redacted]
[redacted]	B&V Plant Safety Director	[redacted]
[redacted]	B&V	[redacted]
[redacted]	AESP Tetra Tech/Sr. Electrical Engineer	[redacted]
[redacted]	AESP Tetra Tech/Sr. Cost Estimate Engineer	[redacted]
[redacted]	AESP Tetra Tech/ Water/Sanitation Sector Lead	[redacted]
[redacted]	AESP Tetra Tech/Electrical Engineer	[redacted]

1. Tetra Tech (Tt) arrived at the Tarakhil Thermal Power Plant (Tarakhil TPP) site at 9:00 am local time. Following the introduction of all the attendees, [redacted] Black and Veatch (B&V) Plant Safety Director gave a safety briefing. [redacted] Programs Director Middle East-B&V, then provided an overview of the existing, recently completed, plant fire suppression and fire detection systems.

2. [redacted] explained that because of leaks in the plant HDPE fire water distribution system only portions of the fire suppression system have been fully operational up to this time. Another problem he reported was that a power surge had burned-out the monitoring computer inside Control Room building B.

3 [redacted] also explained that for firefighting purposes there are multiple systems including gas, foam and water (both dry and wet) installed and operational. [redacted] confirmed that all fire protection systems are functional and, for any kind of fire, the plant is protected. The only remaining problem that B&V is reporting is that the monitoring computers inside control room B are out of order due to the power surge.

4 [redacted] then explained:

1. "Bulb Wet Type" fire protection is used in all generating plants (A, B and C).
2. "Gas Type" fire protection system is used in all control rooms (A, B and C).

3. “Dry Type” fire protection is used in all transformer station location, and

4. “Foam Type” fire protection system is used near fuel tanks.

5. For the “Bulb Wet Type” fire protection system, the chemical wax, which blocks the discharge sprinklers, connected to the pressurized water pipes mounted to the ceiling, in all of the Power House Buildings will melt and the pressurized water will come out of the sprinkler nozzles over the fire area.

6. For the “Gas type” fire protection system, Argon gas will be released in the facility to extinguish the fire.

7. For the “Dry Type” fire protection system, all pipes are pressurized with air to avoid having water freeze in the pipes. In case of fire, the air will be automatically released and water will take its place for fire extinguishing.

8. For the “Foam Type” fire protection system, foam and water will be injected automatically inside the fuel tank. In addition, there are several “foam shooting guns” permanently installed around the fuel tank area perimeter that can be operated manually. Currently there are 60 barrels of foam in this power plant.

9. Additionally, there were “Wet Type” fire hydrants installed all around the compound to extinguish or decrease the intensity of fire in any possible location in the power plant exterior.

10. B&V has scheduled a fire protection engineer from Turkey to be on site Friday, May 18, 2012 to install a new monitor and computer, check the Simplex-USA system settings, establish appurtenant links and replace any defective parts of the monitoring system.

11. [redacted] also stated that the leaking joints in the HDPE pipe have been repaired and one of the repair locations remains excavated and would be part of the plant tour.

12. [redacted] had sketched a plant plan drawing of the buildings and the fire suppression system on a white-board and explained each system component. He said that in addition to the perimeter underground water line with hydrants there are gas, foam and wet types of firefighting systems installed in the buildings and at the tank farm area. B&V provided several copies of a plant site plan drawing with the underground fire water line configuration identified, including hydrants and valve locations as well as pipe sizes.

13. After the fire suppression system review, [redacted] addressed the USAID identified deficiencies which were the basis of this Tt assessment and initial site visit. Ken said all of the deficiencies listed had been addressed and assured that all constructed fire protection systems are functional and adequate to sufficiently protect the facilities.

14. Tt asked for a copy of As-built drawings, specifications and equipment cut-sheets, required for evaluation of the fire suppression systems. [redacted] stated B&V would need to coordinate this with USAID. He requested [redacted] contact USAID to facilitate the transfer of documents.

15. [redacted] said that fire protection and FD&AS (Fire Detection and Alarm System) tests were done per code. There are, however, no written reports on file documenting the system testing.

16. [redacted] also said that after June 13, 2012 there will not be any B&V employees left at the Tarakhil TPP site. He is not sure that the DABS employees are ready to operate the power plant on their own.

17. B&V provided the plant tour for the Tt team which included all the major fire protection facilities. Because of time constraints not all of the plant buildings were entered. The following is a brief summary of the plant tour:

    1. The tour started at the Pump House building which is located beyond the west side of the power plant. Water is supplied from a well and pumped into a storage tank located adjacent to the pump house. Three pumps in the pump house keep the underground fire water line pressurized to 125psi. The three pumps in the pump house, which control the system water-pressure, include one "jockey" pump (for low water pressure demand) and two diesel fire pumps (for higher water pressure demand). The Pump House Fire Alarm Control Panel has a wireless connection to the fire monitoring main control panel, located in the Control Room building B.

    2. B&V simulated a fire by opening a sprinkler valve and reducing water pressure. This activated the fire alarm and sprinkler notification devices in the building. The pumps started in sequence, as required restoring the pressure in underground water line, to maintain the pressure at 125psi.

    3. Next was a demonstration of the power and range of the 125psi underground water line. Hoses were attached to two existing fire hydrants and the hydrant valves were opened. The DABS trainees manned the hoses. The hoses required two men to control. Water was sprayed in the air for several minutes. This demonstration also activated the alarm system.

    4. Tt visited the Foam Pump House. This facility was located next to the fuel tank farm. This facility housed the foam protection system with its associated piping. The system was operating in Auto and Manual options.

18. [redacted] explained that currently the power plant is operating only at peak demand. Therefore, the current staffing is only 41 DABS trainees in Mechanical, Electrical, Operation (including Fire protection) and management.

19. [redacted] added that, B&V will bring a firefighting/protection trainer, who is currently in Kandahar, to train DABS firefighting personnel.

20. Tt asked about the training and its efficiency of the DABS trainees. The trainees replied that their training is going well. They agreed that their training has been very informative and efficient.

21. A "Dry-Type" fire protection system is used to protect the transformers. These transformers are located in three separate buildings adjacent to each of the three Power House Buildings. The systems are dry to prevent freezing. Air pressure closes a bladder separating the 125psi fire water line from the dry pipe. Under a fire condition, the air pressure is released and the dry line is flooded and discharged through a ceiling sprinkler system in the transformer rooms.

22. The fire protection in the Control Room buildings A, B and C are "Gas-Type." Argon gas is automatically released when the smoke and fire detectors are triggered. An alarm system alerts operators to exit the building when the argon gas is released.

23. No drill was performed for the "Gas-Type" system at this facility due to imminent life risk if Argon gas was released. Tt took pictures of the system and gas cylinders. There were eight main Argon gas cylinders and eight spare cylinders. The selection switch for using main or spare cylinders was installed nearby. This facility was equipped with a Detection system. This

facility includes a Firefighting Monitoring System, which is not operational having had its mother boards burned due to a power surge.

24. The tanks in the Tank Farm area are protected with a foam injection system. Foaming chemicals are stored and combined with the pressurized water system and “hard-piped” directly to the tanks. The perimeter of the tank farm is equipped with permanently mounted manually operated foam/water sprayers.

25. The Fire Alarm Control Panel (FACP) monitors the initiating alarm and supervisory devices in the buildings, manual pull stations, sprinkler tamper and flow switches, foam system, limited quantity fire detectors, and other fire protection systems. The FACP activates the notification devices (horn/strobes) upon alarm conditions.

26. The meeting and site visit concluded at 11:30 am local time.

Appendix B

Photographs

Photograph 1: Fire Pump House Building (foreground left), Fire Water Storage Tank

Photograph 2: Foam House C in foreground

Photograph 3: Well Head Piping

Photograph 4: Exposed 250mm HDPE Underground Fire Water Line

Photograph 5: Demonstration of Spray Range

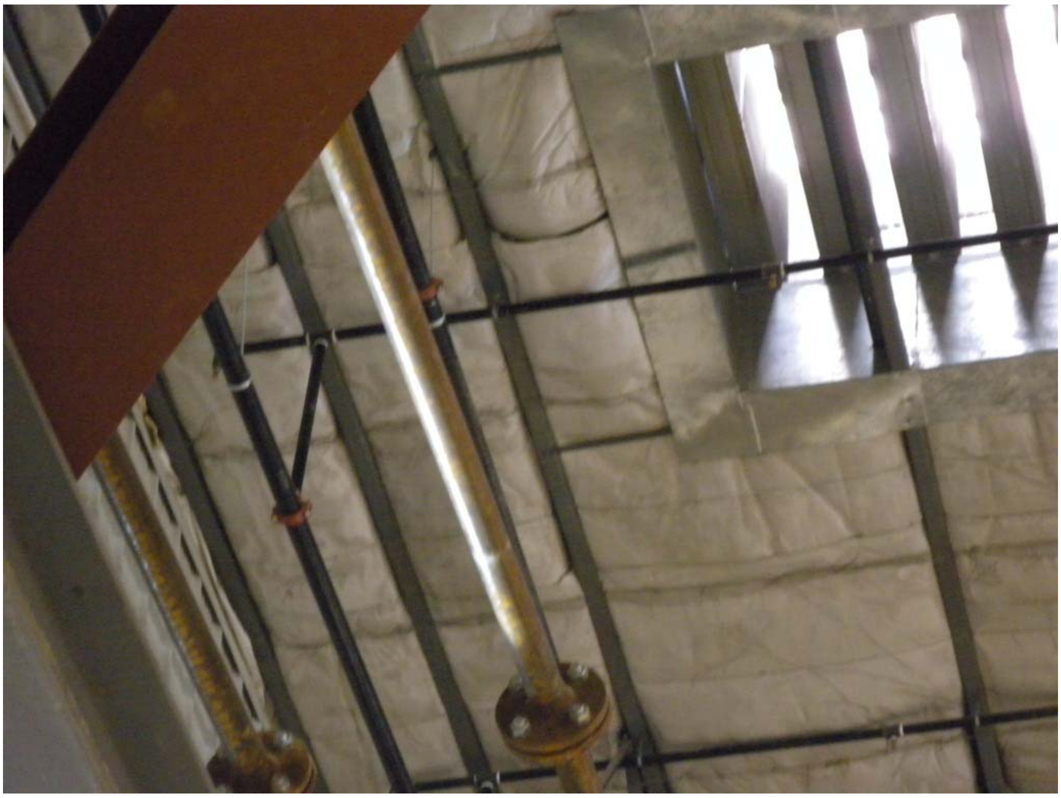
Photograph 6: Fire Hydrant and Hose Cabinet

Photograph 7: Diesel Engine Fire Pump Controller Panel (at start of pressure test)

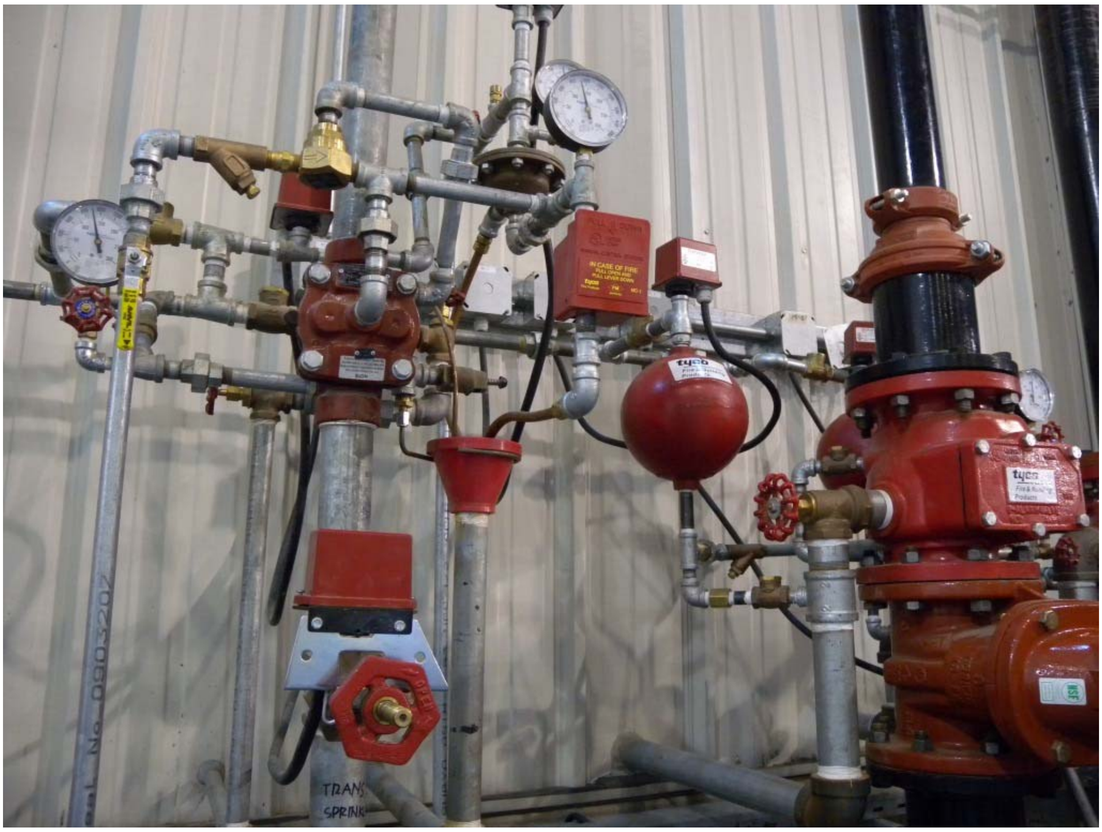
Photograph 8: Diesel Engine Fire Pump Controller Panel (at end of pressure test)

Photograph 9: Pump House Building (piping and pumps).

Photograph 10: Pump House building (sprinkler).



Photograph 11: Sprinkler Pipes at the Ceiling of Power House Building



Photograph 12: Power House Building A, Simplex Sprinkler Water Distribution System

Photograph 13: Power House Building A, Manual Foam Spray Systems

Photograph 14: Power House Building A, Portable Hand Fire Extinguisher

Photograph 15: Ansulite Foam Chemical

Photograph 16: Argon Gas Cylinders

Photograph 17: Gas discharge in Control Rooms

Photograph 18: Water Sprinkler Service Station Transformer Building

Photograph 19: Administration Building Hose Station

Photograph 20: Workshop / Stores Building Simplex Fire Water Distribution System

Photograph 21: Treatment House 1 Foam/Water Sprinkler Head

Photograph 22: Treatment House 1, 200mm Pipe Connection to Underground Fire Water Insulation and Gate Valve (Typical all buildings)

Photograph 23: Treatment House 2 building Mobile Foam Unit

Photograph 24: Foam House Building B Bladder Foam Chemical Storage Tank and Piping (A and C similar)

Photograph 25: Fuel Tanks Foam Piping and Injection Point

Photograph 26: Foam Cannon Demonstration (Foam after drained off-of Treatment House 2 Building)

Photograph 27: Hose station inside NLCC Building

Photograph 28: Central Fire Alarm Monitoring Station Computers

Photograph 29: Fire Alarm Control Panel

30: Radio Transmitter

Photograph 31: Smoke Detector

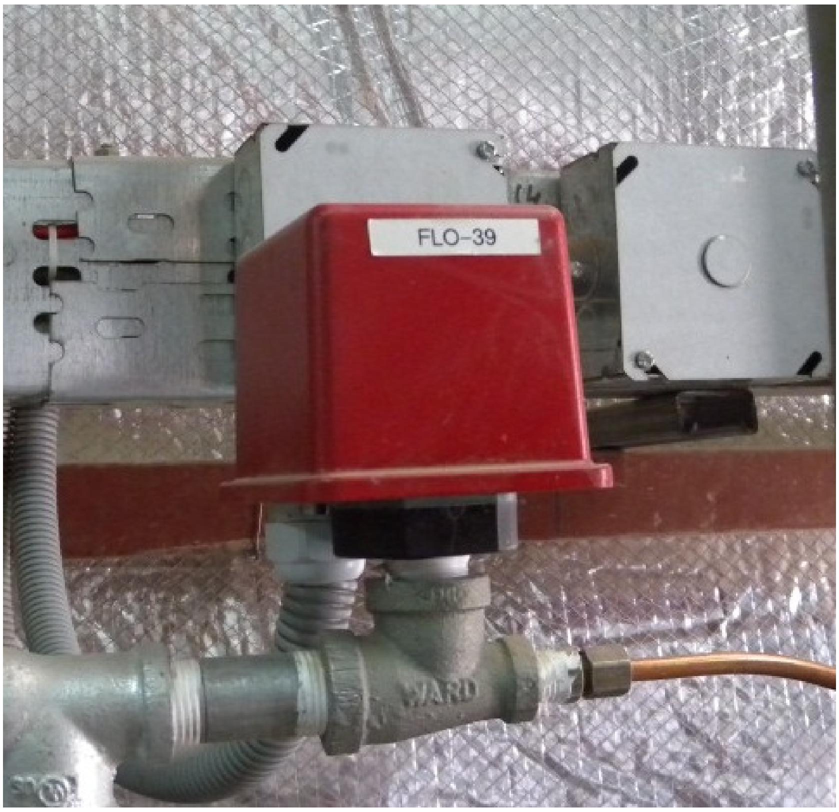
Photograph 32: Heat Detector

Photograph 33: Flame Detector

Photograph 34: Manual Alarm Station

Photograph 35: Horn/Strobe, June 11, 2012, AY

Photograph 36: Tamper Switch



Photograph 37: Flow Switch

Photograph 38: Foam Release Switch

Appendix C

June 5, 2012

Meeting Minutes

Meeting Minutes

120605 WOLT0057 Meeting Minutes AY

Date: June 5, 2012 Location: Tarakhil Thermal Power Plant

Subject: WO-LT-0057 Tarakhil Fire Suppression Assessment- Tt, USAID and B&V personnel meeting

Attendees

Name	Organization	Email Address/Telephone No.
[redacted]	USAID/ACOR	[redacted]
[redacted]	Energy Engineer USAID	[redacted]
[redacted]	Programs Director Middle East-B&V	[redacted]
[redacted]	Power Plant Engineer B&V	[redacted]
[redacted]	B&V	[redacted]
[redacted]	Deputy TOM/Project Controls Manager	[redacted]
[redacted]	B&V Safety Manager	[redacted]
[redacted]	B&V	[redacted]
[redacted]	B&V TO.27 Manager	[redacted]
[redacted]	B&V Senior Fuel	[redacted]
[redacted]	Kabul Fire Department Officer	NA
[redacted]	Kabul Fire Department Officer	NA
[redacted]	AESP Tetra Tech/Sr. Electrical Engineer	[redacted]
[redacted]	AESP Tetra Tech/Civil Engineer	[redacted]
[redacted]	AESP Tetra Tech/ Water/Sanitation Sector Lead	[redacted]
[redacted]	AESP Tetra Tech/Electrical Engineer	[redacted]

1. Tetra Tech (Tt) arrived at the Tarakhil Thermal Power Plant (Tarakhil TPP) site at 9:00 am local time. Following brief introductions and a safety briefing, conducted by [redacted] Black and Veatch (B&V) Plant Safety Manager, the Tt and B&V inspection team proceeded to the Pump House building to observe the initial pressure setting for the HDPE pipe pressure test.
    1. One of the primary objectives of the site visit was to witness the pressure test of the 125 psi HDPE underground fire water line. Shortly after construction, when the fire water pipe was first pressurized it was discovered that several joints in the pipe were defective. B&V had stated that all of the defective fused HDPE joints had been excavated and re-fused. B&V had agreed to pressure test the pipe during this second site visit for the inspection using the Plastic Pipe Institute (PPI) test procedure provided by Tt. The PPI test requirements called for pressurizing the pipe system for four hours, 1.5 x working pressure (1.5 X 125 psi = 187.5 psi) then reducing pressure

10 psi, to 178.5 psi for one hour. The 178.5 psi pressure must then remain within 5% of the target value to indicate no leaks in the pipe system.

2. B&V started the four hour pressurizing process at 5:30 am to accommodate the site visit schedule. During the four hour period of the test the HDPE is "stretched" and additional pressure is applied as required to maintain the 187.5 psi pressure.
3. The inspection team arrived at the Pump House building at 9:38 am to witness the pressure being reduced to 178.5 psi for the one hour test period. The inspection team returned to the Pump House building at 10:30 am to witness the pressure reading which had dropped to 173 psi. This represents a pressure drop of approximately 2.8%, well within the 5% compliance range. Since the test period was slightly less than the full one hour, B&V personnel remained at the pump house till the full hour had expired.
4. B&V had run the identical test several times since the pipe repairs were completed and observed similar results. The previous test results as well as the detailed from this pressure test will be transmitted to Tt and USAID.

2. [redacted] B&V safety manager has returned from Kandahar and had conducted one week of basic firefighting training for 43 DABS operational personnel inside the Tarakhil TPP.

3. The inspection team visited the Well House building to observe the pumping operations. The one (1) existing submersible well pump provides water for both the fire water storage tank and the site compound. Tt expressed concern that there is only one pump available. B&V stated that they have a spare pump available to replace the existing pump if required and could be installed in a couple of hours.

4. Next location for the inspection team was the Unloading Stations. B&V discussed the sensitivity of the flame detectors which are mounted on the existing canopies for fire detection. There is no sprinkler system at the Unloading Stations; they have portable 9 kg dry chemical, 5 kg CO_2 and portable foam extinguishers. There are also two existing fire hydrants located close by the Unloading Stations.

5. USAID representative joined the inspection team at the Station Service Transformer A building to inspect the "Dry-Type" sprinkler system. The fire suppression water comes from the Power House building A. The fire suppression systems in Station Service Transformer A and B buildings are identical.

6. The Administration Building has no sprinkler system but has two hose stations.

7. We visited the workshop building and observed the two hose stations and the portable fire suppression extinguishers.

8. Fires in Treatment Building #1 can be suppressed by either water or foam through the overhead sprinkler system. The "Bulb-Wet" Type sprinkler system is connected to the automatic foaming system in Foam House B. In addition to the sprinkler system there are two hose stations that are connected to the underground fire water line.

9. Treatment Building #2 is smaller but has similar fire suppression systems as Treatment Building #1. The sprinklers system is connected to the automatic foaming system in Foam House C and has only one hose station.

10. B&V demonstrated the foaming system by spraying foam from one of the cannons, located near Foam House C, which are permanently mounted on the containment wall around the tank farm area.

11. The Simplex fire detection and alarm system technician had arrived on the site about a week ago. He resumed working on the Simplex monitoring system located in Control House B.

    It was stated by B&V that the system is receiving and sending signals from/to each Remote Radio Transmitters installed in each building having Fire Alarm Control Panel (FACP). They are experiencing problems with Simplex software. Currently, efforts are being made to overcome this problem and get the system functional. During our second site visit, the main receiver was not picking up signals. The system was not functional. We received an e-mail, since our site visit, from B&V that confirmed that the system is working now. B&V will send Tt the fire detection system test reports including colored pictures of the monitor screen during testing.

12. The final field investigation included a brief visit to the National Load Control Center (NLCC) Building. The building has no sprinkler system but has one hose station.

13. The site visit concluded with a conference including all inspection team participants (B&V, Tt and USAID) and two members of the Kabul Fire Fighting Department (KFFD). KFFD attended one day of the one week fire training that B&V conducted for DABS operational personnel. KFFD stated that the training focused on theory and practical training on basic firefighting techniques and procedures to minimize the risks of fire as much as possible until the nearest KFFD arrived on the site and engaged the fire.

14. KFFD acknowledged that the existing fire detection and suppression system in the plant was the “most advanced” that they had personally observed.

15. KFFD is under the opinion there should be a dedicated fire-fighting department consisting of a minimum of six personnel located inside the plant.

16. The B&V provided firefighting training included:
    1. Usage of portable fire extinguishers for fire extinguishing
    2. Usage of wall mounted water hoses
    3. Usage of permanently mounted foam stations
    4. Usage of mobile foam carts
    5. Basic training to familiarize the operational personnel on automatic fire suppression system, including Power House sprinkler systems.
    6. The importance of minimizing potential for further fire damage by shutting down the equipment that could cause further damage.

17. B&V conducted firefighting training slides were provided by B&V to Tt.

18. B&V provided three (3) additional CD’s of data to Tt. Including fire training photos, test reports and additional information.

19. The meeting and site visit concluded at 14:00 pm local time.

Appendix D

Fire Water Loop Pressure

Test Results

Fire Water Loop Pressure Test Results

PRESSURE TEST DATA REPORT

BLACK & VEATCH
105 MW Tarakhil Power Plant
USAID

Startup Pakage: Fire suppression Sysyem
Project number: 42181
Date: 30-May-12

Test Type: Underground HDPE pipe Hydrostatic pressure Test
System : Simplex Fire protection system
Tested by: [redacted]

BOUNDARY (Scope Drawings listed below are attached)

Yellow high lited underground fire protection system

TEST PREPARATION

All welds inspected and approved	Yes
Test boundaries checked and isolated	Yes
System properly supported	Yes

TEST COMPONENTS

Test gauge range	0-300 PSI
Calibration date	May-12

TEST DATA

Test to (Code or attached procedure) Plastic pipe Industries Test Report-31 (PPI TR-31)
Last one hour system pressure should not drop more than 5% or 9.5 PSI below 177PSI

Test Media: Water

Test pressure	187.5 PSI 4 hours adding water	Test Duration	4 hours (4.00PM to 8.00PM)
Start pressure	177 PSI 1 hour no adding water	Start Time	8.06PM
Finish Pressure	175 PSI	Finish time	9.06PM

Criteria	Pressure drop lessthan 9.5PSI
Pressure drop	02PSI < 5% or 9.5PSI
Result	Passed

Name	Company	Date
[redacted]	B & V	30-May-12
	B & V	30-May-12

Approvals
Commissioning Engineer [redacted]
Quality control
(as applicable)

PRESSURE TEST DATA REPORT

BLACK & VEATCH
105 MW Tarakhil Power Plant
USAID

Startup Pakage: Fire suppression Sysyem
Project number: 42181
Date: 05-Jun-12

Test Type Underground HDPE pipe Hydrostatic pressure Test
System Simplex Fire protection system
Tested by: [redacted]

BOUNDARY (Scope Drawings listed below are attached)

Yellow highlited underground fire protection system

TEST PREPARATION

All welds inspected and approved	Yes
Test boundaries checked and isolated	Yes
System properly supported	Yes

TEST COMPONENTS

Test gauge range	0-300 PSI
Calibration date	May-12

TEST DATA

Test to (Code or attached procedure) Plastic pipe Industries Test Report-31 (PPI TR-31)
Last one hour system pressure should not drop more than 5% or 9.5 PSI below 177PSI

Test Media Water

Test pressure	187.5 PSI 4 hours adding water	Test Duration	5:08 hours (5.30AM to 10.38AM)
Start pressure	178 PSI 1 hour no adding water	Start Time	9.38AM
Finish Pressure	173 PSI	Finish time	10.38AM

Criteria	Pressure drop lessthan 9.5PSI
Pressure drop	05PSI < 5% or 9.5PSI
Result	Passed

Name	Company	Date
[redacted]	B & V	5-Jun-12
	B & V	5-Jun-12
	Tetra Tech	5-Jun-12

Approvals

Commissioning Engineer [redacted] 05/ Jun/12

Quality control
(as applicable)

Witness(Mark Jensen) [redacted]

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